

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

1. (currently amended): An electronic paper reading device comprising:
a reading component ~~for which~~ optically reading reads an electronic paper which is filled out by hand, in a state in which a first image which has been recorded on the electronic paper in advance, ~~being is~~ being displayed;
a recognition component ~~for recognizing which recognizes~~ the first image; and
an extracting component ~~for extracting which extracts~~ image data of a second image that represents contents with which the electronic paper is filled out by hand, based on a recognizing result of the recognition of the first image by the recognition component, from a result of the reading by the reading component,
wherein the reading component converts images optically read from the electronic paper into digital data and inputs the digital data of the images to the recognition component and the extracting component.
2. (original): The device of claim 1, wherein
the recognition component recognizes the first image by obtaining image data of the first image, and
the extracting component extracts image data of the second image by estimating the first image in accordance with the reading result by the reading component based on the image data

obtained by the recognition component, and removing the first image, which is estimated from an image represented by the reading result.

3. (original): The device of claim 2, wherein
identification information for identifying image data of the first image or a storage location of the image data is recorded on the electronic paper, and
the recognition component obtains the image data by reading the image data from the electronic paper or identifies the storage location of the image data based on identification information read from the electronic paper, and obtains the image data from the identified storage location.

4. (original): The device of claim 2, wherein the extracting component removes the estimated first image by converting, among respective image pixels of the image represented by the reading result, densities of image pixels which correspond to the estimated first image and whose density difference from corresponding image pixels of the estimated first image is less than a predetermined value or densities of image pixels the densities of which are within a density range which has been defined in accordance with the estimated first image, to a density of the electronic paper in a state in which an image is not recorded thereon.

5. (currently amended): The device of claim 1 further comprising a control component which recognizes identification information for identifying the electronic paper which is filled out by hand, and which associates the obtained image data of the second image with the identification information and manages the image data of the second image.

6. (original): The device of claim 5, further comprising a detection component for detecting a relationship between an orientation of the electronic paper or the first image, and that of the second image, wherein, based on the relationship detected by the detection component, the control component controls the image data of the second image to orient the first image and the second image in the same direction when both the first image and the second image are recorded on the electronic paper.

7. (withdrawn): An electronic paper reading device comprising:
a delete control component for deleting a display of a first image from an electronic paper which is filled out by hand in a state in which a first image which has been recorded on the electronic paper in advance, is being displayed; and
a reading component for obtaining image data of a second image representing contents with which the electronic paper is filled out by hand, by optically reading the electronic paper from which the display of the first image has been deleted by the delete control component.

8. (withdrawn): The device of claim 7, further comprising a control component which recognizes identification information for identifying the electronic paper which is filled out by hand, and which associates the obtained image data of the second image with the identification information and manages the image data.

9. (withdrawn): The device of claim 8, further comprising a detection component for detecting a relationship between orientation of the electronic paper or the first image, and that

of the second image, wherein, based on the relationship that is detected by the detection component, the control component controls the image data of the second image to orient the first image and the second image in the same direction when both the first image and the second image are recorded on the electronic paper.

10. (withdrawn): An electronic paper reading device comprising:

a reading component for optically reading an electronic paper which is filled out by hand in a state in which a first image which is recorded in advance on the electronic paper is being displayed, wherein

the electronic paper is filled out by hand by using ink having characteristics such that a reflectance of the ink is different from that of the electronic paper within a predetermined wavelength region in which a difference of at least one of a reflectance and a light emitting energy between a portion on the electronic paper at which the first image is recorded and a portion on the electronic paper at which the first image is not recorded thereon is less than a predetermined value, and

the reading component obtains image data of a second image that represents contents with which the electronic paper is filled out by hand by optically reading the electronic paper by using a sensor which is sensitive to the predetermined wavelength region.

11. (withdrawn): The device of claim 10, further comprising a control component which recognizes identification information for identifying the electronic paper which is filled out by hand, and which associates the obtained image data of the second image with the identification information and manages the image data.

12. (withdrawn): The device of claim 11, further comprising a detection component for detecting a relationship between orientation of the electronic paper or the first image, and that of the second image, wherein, based on the relationship that is detected by the detection component, the control component controls the image data of the second image to orient the first image and the second image in the same direction when both the first image and the second image are recorded on the electronic paper.

13. (withdrawn): An electronic paper reading system comprising:

an electronic paper reading device; and

a control device,

wherein the electronic paper reading device and the control device are connected to each other via a network so as to be able to communicate with each other,

the electronic paper reading device including:

a reading component for optically reading an electronic paper which is filled out by hand, in a state in which a first image which has been recorded on the electronic paper in advance is displayed;

a recognition component for recognizing the first image; and

an extracting component for extracting image data of a second image that represents contents with which the electronic paper is filled out by hand, based on a recognizing result of the first image by the recognition component and a reading result due to the reading component, and

wherein the control device recognizes identification information for identifying the electronic paper which is filled out by hand, and associates the obtained image data of the second image with the identification information and manage the image data.

14. (currently amended): An electronic paper reading method comprising the steps of:

(a) optically reading an electronic paper which is filled out by hand in a state in which a first image which has been recorded on the electronic paper in advance, ~~is~~ is being displayed;

(b) recognizing the first image; and

(c) extracting, from a result of the reading in the step (a), image data of a second image that represents contents with which the electronic paper is filled out by hand, based on a recognized result from the first image in the step (b),

wherein the optical reading includes converting images optically read from the electronic paper into digital data.

15. (previously presented): The device of claim 1, wherein the first image is an electronic image recorded electronically on the electronic paper in advance of being filled out by hand, and the first image being displayed on the electronic paper.

16. (previously presented): The device of claim 1, wherein the recognition component recognizes image data of the first image, which is separate from the image data of the second image, by obtaining the image data of the first image.

17. (previously presented): The device of claim 2, wherein the recognition component recognizes image data of the first image, which is separate from the image data of the second image.

18. (previously presented): The device of claim 1, wherein image data of the first image and image data of the second image form an overlapped image which is represented by the reading result of the reading component.

19. (previously presented): The device of claim 18, wherein the image data of the second image is extracted from the overlapped image based on the recognized image data of the first image.

20. (previously presented): The device of claim 1, wherein image data of the first image is represented by a plurality of pixels of the electronic paper which are turned on by applying a voltage to a plurality of corresponding pairs of electrodes of the electronic paper and image data of the second image represents data written by hand.

21. (previously presented): The device of claim 2, wherein image data of the first image and image data of the second image form the image represented by the reading result of the reading component.

22. (previously presented): The device of claim 21, wherein the image data of the second image is extracted from the image represented by the reading result based on the recognized image data of the first image.

23. (previously presented): The device of claim 2, wherein image data of the first image is represented by a plurality of pixels of the electronic paper which are turned on by applying a voltage to a plurality of corresponding pairs of electrodes of the electronic paper and image data of the second image represents data written by hand.

24. (new): The device of claim 1, wherein the reading component irradiates light onto the electronic paper and photo-electrically converts the light reflected or transmitted through the electronic paper by using a reading sensor and converts the converted data into the digital data.

25. (new): The device of claim 1, wherein the images converted by the reading component include an overlapped image of the first image and the second image.

26. (new): The device of claim 1, wherein the second image that represents the contents with which the electronic paper is filled out by hand is written to the electronic paper by a writing device which alters a light reflectance of the electronic paper by depositing ink thereon.

27. (new): The device of claim 26, wherein image pixels of the second image have a light reflectance within at least a predetermined wavelength region different from a light

reflectance of image pixels of the first image and a light reflectance of an non-imaging portion of the electronic paper.

28. (new): The device of claim 1, wherein

the recognition component recognizes the first image by obtaining image data of the first image,

and the extracting component estimates a pixel density of each image pixel corresponding to the image data of the first image obtained by the recognition component.

29. (new): The device of claim 28, wherein the extracting component determines a density difference for each image pixel corresponding to the image data of the first image obtained by the recognition component by comparing a pixel density of each image pixel of the reading result corresponding to the image pixels of the recognized first image with the estimated pixel density of a corresponding image pixel of the recognized first image.

30. (new): The device of claim 29, wherein the extracting component converts pixel densities of the image pixels, among respective image pixels of the image represented by the reading result, corresponding to the image data of the first image obtained by the recognition component whose density difference is less than a predetermined value to a density of the electronic paper in a state in which an image is not recorded thereon.

31. (new): The device of claim 30, wherein only the pixel densities of image pixels of the first image which do not correspond to an image pixel of the second image are converted to the density of the electronic paper in a state in which an image is not recorded thereon.

32. (new): The device of claim 30, wherein the pixel density of image pixels corresponding to the image data of the first image obtained by the recognition component, which also correspond to an overlapped pixel including contents of the first image and of the second image, are not converted to the density of the electronic paper in a state in which an image is not recorded thereon

33. (new): The electronic paper reading method of claim 14, wherein the digital data represents image data of an overlapped image including the first image and the second image.